Claims

1. A composition having laser engraving properties, comprising:

a host material, the host material comprising a material modified by a first process, whereby the host material as modified by the first process has increased thermal conductivity as compared to the host material before the first process; and

an effective amount of a laser enhancing additive, the laser enhancing additive comprising:

a first quantity of at least one of copper potassium iodide ($CuKI_3$), Copper Iodide (CuI), potassium iodide (KI), sodium iodide (NaI), and aluminum iodide (AlI); and

a second quantity of at least one substance selected from the group consisting of zinc sulfide (ZnS), barium sulfide (BaS), alkyl sulfonate, and thioester.

2. The composition of claim 1, wherein the material comprises a polymer.

3. The composition of claim 1 wherein the host material is substantially optically transparent to laser radiation.

4. The composition of claim 3 wherein the first process does not substantially interfere with the host material's substantial optical transparency to laser radiation.

5. The composition of claim 1, wherein the first process comprises adding cross linked functionality to the polymer.

6. The composition of claim 5 wherein the first process further comprises adding at least one of a coupling agent and a coupling primer to the host material.

7. The composition of claim 6 wherein the coupling agent comprises at least one of a silane, silicone, a silicon compound, organosilicone, organosilane, and gamma-aminopropyltriethoxy silane.

8. The composition of claim 5 wherein the first process further comprises adding a first material to the host material that forms relatively weak secondary bonds between at least one of (a) the host material and the laser enhancing additive, and (b) a first portion of the laser enhancing additive and a second portion of the laser enhancing additive.

9. The composition of claim 1 wherein the first process comprises adding a second material to the host material, the second material being more thermally conductive than the host material.

10. The composition of claim 9 wherein the second material comprises at least one of glass beads, glass fibers, glass threads, CR-39, polyurethane, and a cross linked moiety.

11. The composition of claim 1wherein the first process comprises adding to the host material:

a first material, the first material comprising at least one of a coupling agent, a coupling primer, and material that forms relatively weak secondary bonds between at least one of (a) the host material and the laser enhancing additive, and (b) a first portion of the laser enhancing additive and a second portion of the laser enhancing additive; and

a second material, the second material being more thermally conductive than the host material.

12. The composition of claim 11 wherein the second material comprises glass.

13. The composition of claim 1, wherein the first process comprises altering at least a portion of the free volume of the host material.

14. The composition of claim 13 wherein the first process further comprises at least one of reducing the free volume and adding a volume filling material to the host material.

15. The composition of claim 1, wherein the first process comprises processing the host material to change at least one of its orientation and density.

16. The composition of claim 13, wherein the first process further comprises at least one of blowing, spinning, photomanipulation, ribbon extrusion, and tubular extrusion.

17. The composition of claim 1, wherein the first process comprises selecting a host material having a high degree of crystallinity.

18. The composition as recited in claim 1, wherein the composition comprises at least one of a laminate and a coating.

19. The composition as recited in claim 1, wherein the composition is laser engraveable to form a grayscale image.

20. An article of manufacture capable of being laser engraved with a grayscale image, comprising:

a core layer having a first surface;

a first layer comprising a first host material, the first host material comprising a material modified by a first process, whereby the host material as modified by the first process has increased thermal conductivity as compared to the host material before the first process, the host material further comprising an effective amount of a first laser enhancing additive comprising at least one of one of copper potassium iodide ($CuKI_3$), Copper Iodide (CuI), potassium iodide (KI), sodium iodide (NaI), and aluminum iodide (AI); and

a second layer comprising a second host material, the second layer oriented in relation to the first host material such that a single laser beam can penetrate both at least a portion of the first layer and at least a portion of the second layer, the second host material comprising an effective amount of a second laser enhancing additive, the second laser enhancing additive selected from the group consisting of zinc sulfide (ZnS), barium sulfide (BaS), alkyl sulfonate, and thioester;

wherein the first and second layers are operably coupled to each other and at least one of the first and second layers is operably coupled to the first surface of the core layer.

21. The article of manufacture of claim 20, wherein the first process comprises at least one of:

adding cross linked functionality to the host material;

adding a conductive material to the host material, the conductive material being a material that is more thermally conductive than the host material;

altering at least a portion of the free volume of the host material; and

processing the host material to change at least one of its orientation and density.

22. The article of manufacture of claim 20, wherein the article is an identification document.

23. A method of engraving a host material by exposing the material to laser radiation, comprising:

providing a host material;

performing a first process on the host material to increase the thermal conductivity of the host material;

adding to the host material an effective amount of a laser enhancing additive, the laser enhancing additive comprising:

at least one of copper potassium iodide ($CuKI_3$), Copper Iodide (CuI), potassium iodide (KI), sodium iodide (NaI), and aluminum iodide (AI); and

at least one substance selected from the group consisting of zinc sulfide (ZnS), barium sulfide (BaS), alkyl sulfonate, and thioester; and

exposing the host material to laser radiation in a manner that causes the material to be engraved by the laser radiation.

24. The method of claim 23, wherein the first process comprises at least one of:

adding cross linked functionality to the host material;

adding a conductive material to the host material, the conductive material being a material that is more thermally conductive than the host material;

altering at least a portion of the free volume of the host material; and

processing the host material to change at least one of its orientation and density.